INSTRUCTION BOOK

FOR

CABLE LASHING MACHINE LC-231/FT

MANUFACTURED BY

GENERAL MACHINE PRODUCTS CO.

ORDER NO. 26944-PHILA-51-12

7 JULY 1952

CORRECTIONS:

Page 3 - Par. 5 (3) Delete
Jan - P - 117 (2).
Insert Jan - P - 116 (2).

Page 4 - Par. 5 (5) Second Line
Delete 1 - A - 9 and Jan - P - 117 (2).
Insert 1 - A - 8 and Jan - P - 116 (2).

Per Auth Tech Section
Phila. Inspection Branch
HB Telcon 5 Aug. 1952

INSTRUCTION BOOK

FOR

CABLE LASHING MACHINE LC-231/FT

MANUFACTURED BY

GENERAL MACHINE PRODUCTS CO.

ORDER NO. 26944-PHILA-51-12

7 JULY 1952

CONTENTS

		Paragraph	Page
CHAPTER 1.	**INTRODUCTION.**		
Section I.	General.		
	Scope	1	1
	Forms and records	2	1
II.	Description and data.		
	Purpose and use	3	1
	Technical characteristics	4	2
	Packing data	5	3
	Description of components	6	4
	Additional equipment required	7	5
CHAPTER 2.	**OPERATING INSTRUCTIONS.**		
Section I.	Service upon receipt of material.		
	Uncrating, unpacking, and checking new equipment	8	6
	Preparation of cable lasher for operation	9	6
II.	Operation under usual conditions.		
	Operating procedure	10	7
	Removing lasher from suspension strand	11	9
III.	Operation under unusual conditions.		
	General	12	9
	Arctic, tropical, desert, and high humidity climates	13	10
CHAPTER 3.	**ORGANIZATIONAL MAINTENANCE INSTRUCTIONS.**		
Section I.	Preventive maintenance services.		
	Definition of preventive maintenance	14	11
	General preventive maintenance techniques	15	11
II.	Lubrication.		
	Lubrication under usual conditions	16	12
	Lubrication under unusual conditions	17	12

		Paragraph	Page
III.	Weatherproofing.		
	Weatherproofing	18	12
	Rustproofing	19	13
IV.	Trouble shooting at organizational maintenance level.		
	Trouble-shooting steps	20	13
	Visual inspection	21	13
	Trouble shooting (using equipment performance checklist)	22	14
	Equipment performance checklist	23	15
CHAPTER 4.	**FIELD MAINTENANCE INSTRUCTIONS.**		
Section I.	Maintenance.		
	General	24	17
	Trouble-shooting procedure	25	17
	Trouble-shooting chart	26	17
II.	Disassembly and repair.		
	Step-by-step disassembly and repair	27	18
	Reassembly	28	19
CHAPTER 5.	**SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE.**		
Section I.	Shipment and limited storage.		
	Repacking for limited storage	29	20
	Repacking for shipment	30	20
II.	Demolition of materiel to prevent enemy use.		
	Methods of demolition	31	20
	Destruction of components	32	21
APPENDIX I.	**REFERENCES**		22
II.	**IDENTIFICATION TABLE OF PARTS**		24
INDEX			30

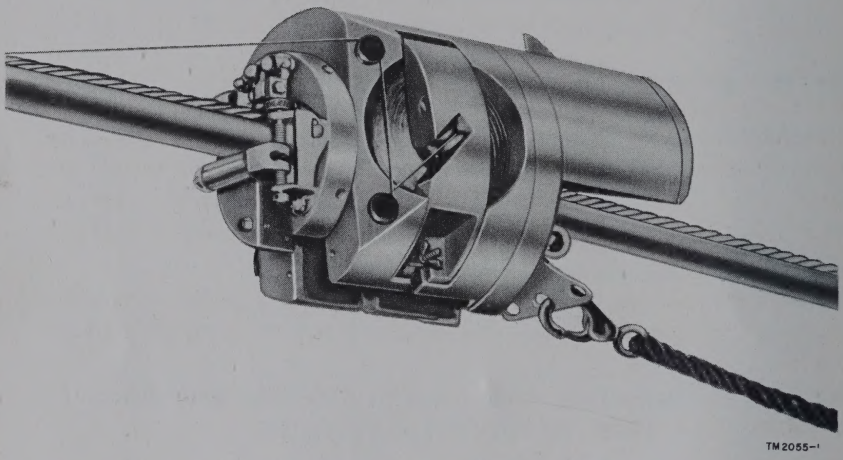

Figure 1. Cable Lashing Machine LC-231/FT, in operation

Note. This instruction book will be replaced by TM 11-2055 which, when published, will be listed in SR-310-20-4.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. These instructions are published for the information and guidance of the personnel to whom this equipment is issued. They contain a physical description of the equipment, operating and maintenance information, the theory of operation, replacement of parts, repacking for shipment and limited storage, and instructions for demolishing the equipment to prevent enemy use. These instructions apply only to Cable Lashing Machine LC-231/FT.

b. This manual contains five chapters and two appendixes. Appendix I contains a list of references; appendix II contains an identification table of parts.

2. Forms and Records

The following forms will be used for reporting unsatisfactory conditions of Army equipment:

a. DD Form 6, Report of Damaged or Improper Shipment, will be filled out and forwarded as prescribed in SR 745-45-5 (Army), NAV DEPT SERIAL 85POO (Navy), and AFR 71-4 (Air Force).

b. DA AGO Form 468, Unsatisfactory Equipment Report, will be filled out and forwarded to the Office of the Chief Signal Officer, as prescribed in SR 700-45-5.

c. AF Form 54, Unsatisfactory Report, will be filled out and forwarded to Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio, as prescribed in SR 700-45-5 and AFR 65-26.

d. Use other forms and records as authorized.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. Cable Lashing Machine LC-231/FT (fig. 1.) is used to lash aerial telephone cable to a suspension strand with .045-inch diameter stainless steel lashing wire. It is designed for cables of 1-5/8-inch or smaller diameter and a suspension strand of 5/16-inch to 7/16-inch diameter.

Note. Throughout this manual, the machine is referred to as a cable lasher or a lasher.

b. The cable lasher weighs approximately 33 pounds, without lashing wire. The over-all dimensions of the lasher are: length, 18-1/2 inches; diameter, 9-3/4 inches.

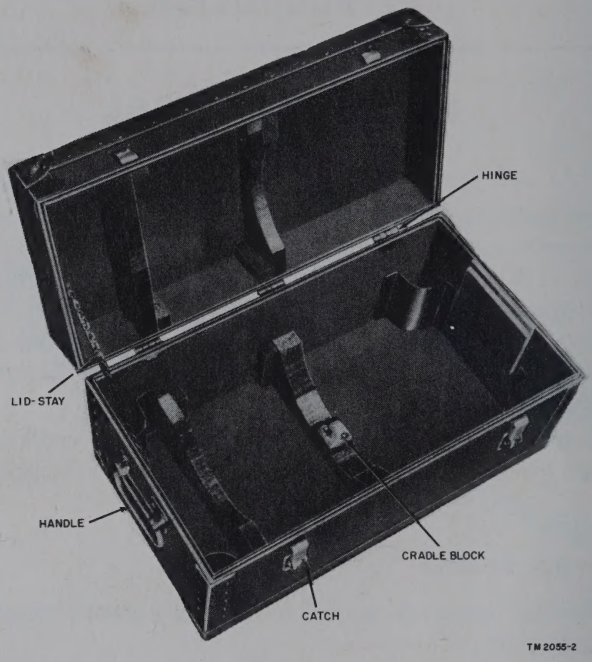

Figure 2. Carrying Case for Cable Lashing Machine LC-231/FT.

4. Technical Characteristics

a. The parts of Cable Lashing Machine LC-231/FT are made of heat-treated, high-strength aluminum, bronze, and zinc-plated steel.

b. Sealed, aircraft-type, dustproof ball bearings are used on all shafts and the rotatable drum. Other moving parts are mounted in Oilite bushings.

c. Two rubber strand drive wheels are mounted in the forward part of the carriage, and a small trailer wheel is located in the rear end of the lasher (fig. 6).

d. Driving is accomplished by direct gearing.

e. The rear cable lifter is adjustable vertically (fig. 5). The front cable lifter roller, together with the pulling plate, is opened by pressing a latch (fig. 3). With the front cable lifter in open position, the drum locks automatically when its cable slot registers with the cable slots in the carriage.

f. The drum is released when the front cable lifter is closed.

g. Toggle devices hold both front and rear cable lifters in open position.

h. The all-range, strand-tensioning device is finger-operated.

i. The rotating drum lock is self-registering.

j. The automatic two-way brake prevents back roll. It releases when the front cable lifter (fig. 3) is open and when the pulling plate is moved back against its stops.

k. The lashing wire coils are center feed and nonrotating.

l. The working parts and controls are shown in figure 3.

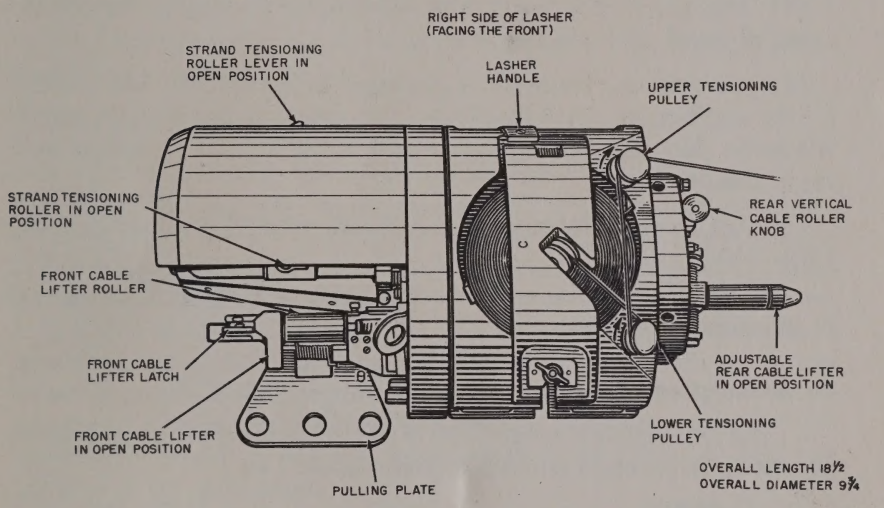
RIGHT SIDE OF LASHER (FACING THE FRONT)
STRAND TENSIONING ROLLER LEVER IN OPEN POSITION
LASHER HANDLE
UPPER TENSIONING PULLEY
STRAND TENSIONING ROLLER IN OPEN POSITION
REAR VERTICAL CABLE ROLLER KNOB
FRONT CABLE LIFTER ROLLER
FRONT CABLE LIFTER LATCH
ADJUSTABLE REAR CABLE LIFTER IN OPEN POSITION
FRONT CABLE LIFTER IN OPEN POSITION
LOWER TENSIONING PULLEY
PULLING PLATE
OVERALL LENGTH 18½
OVERALL DIAMETER 9¾
TM 2055-3

Figure 3. Cable Lashing Machine LC-231/FT, working parts and controls.

5. Packaging Data

a. PRESERVATION AND PACKAGING. (1) The cable lasher is cleaned and preserved in accordance with specification JAN-P-116(2).

(2) All preserved parts are protected with grade A paper suitably secured with pressure-sensitive tape.

(3) Packaging is in accordance with method 1, specification, JAN-P-117(2).

(4) The cable lasher is placed within the carrying case with suitable protection of flexible corrugated paper.

(5) All fastenings of the carrying case are secured.

(6) All sharp projections, corners, and fastenings of the carrying case are covered with flexible corrugated paper which is secured with tape.

b. PACKING. (1) For domestic shipment, the carrying case containing the cable lasher is packed in substantial commercial containers of the type, size, and kind commonly used for this purpose; it is packed in such a manner to assure safe delivery to the designated points by common or other carriers at the lowest rate.

(2) For oversea shipment, each cable lasher is placed snugly in a nailed, wooden box conforming to specification JAN-P-106A.

(3) Each shipping container is lined with a waterproof case liner conforming to specification JAN-P-125(1).

(4) The case liner is sealed with adhesive conforming to the requirements of specification JAN-P-140.

(5) All technical literature is packaged in accordance with method 1-A-9, specification JAN-P-117(2). The technical literature is packed within the shipping container and secured to the contents to prevent shifting in transit.

(6) The shipping container is closed and strapped in accordance with JAN-P-106A.

c. MARKING. Interior packages and shipping containers are marked in accordance with MIL-STD-129.

6. Description of Components

a. The following is a break-down of the components of the cable lasher and the figure numbers in which they are shown.

Component	*Figure Nos.*
Carrying case	2
Front cable lifter	3
Lashing wire tensioning pulleys	3, 4, 6
Pulling plate and pulling eyes	3, 4, 6
Rear cable lifter	3, 5, 6
Rear strand trailer wheel	6
Rotating drum	4
Strand drive wheels	6
Strand-tensioning roller	3, 6,
Vertical cable rollers	5
Wire magazine cover	6

b. The lasher consists essentially of a rotating drum; a carriage which provides for mounting a gear-drive mechanism, front and rear cable lifters, cable and strand rollers, and an automatic brake; and a towing plate and two towing eyes for attaching the towing bridle (subpar. *d* below).

c. The rotating drum contains two magazines, each of which accommodates one 1,200-foot coil of .045-inch diameter stainless steel lashing wire. Two sets of tensioning pulleys are provided to guide and tension the lashing wire in the lashing operation.

d. The lasher is pulled along the strand (from the ground) by means of a towing line. As the lasher moves forward, the lashing wire (fed from the rear) is spirally wound around the cable and the strand. The towing line is linked to the towing bridle, which consists of a 48-inch length of 3/8-inch diameter manila rope, each end of which is equipped with a snap hook. The front of the lasher is equipped with a pulling plate in which there are three holes, a pulling eye on one side of the pulling plate (fig. 4) and another pulling eye on the opposite side. The towing bridle is linked into the plate or eyes as follows:

(1) Into the center hole of the plate, when the towing line is approximately in line with the pole line.

(2) Into a side hole of the plate for an ordinary side pull.

(3) Into a pulling eye when the side pull is excessive.

e. A carrying case (fig. 2) is provided for transporting the lasher and for protecting it when it is not in use. The carrying case is constructed of 1/2-inch plywood, reinforced with riveted steel-band edges and corners and finished with olive-drab paint. The empty case weighs 25 pounds and is 21-1/2 inches long, 13 inches wide, and 13 inches deep. The interior is provided with wood-metal-leather blocks which form a cradle for the lasher, space for storing the towing bridle, a compartment for instruction books, and a chain-type lid stay. The exterior hardware consists of one folding-type handle on each end, three outside-mounted hinges, and two spring-type catches in front.

7. Additional Equipment Required

Cable Lashing Machine LC-231/FT is delivered without lashing wire. The chart below gives the Signal Corps stock numbers and other data for the additional tools and materials required.

Description	Use	Signal Corps Stock No.
Rope RP-17: manila, 1/2" dia.	Handline for towing lasher.	6Z7906
Type C cable lashing clamp.	For permanently terminating lashing wire to strand.	2Z2642.618
Type C wire lashing grip.	For securing lashing wire temporarily to suspension strand.	6027400-1
Lashing wire, SS, .045" dia.	For lashing the cable to the suspension strand.	1A520-1

CHAPTER 2
OPERATING INSTRUCTIONS

Section I.
SERVICE UPON RECEIPT OF MATERIAL

8. Uncrating, Unpacking, and Checking New Equipment

a. Cut the steel strapping.

b. Pry open the top of the wooden shipping container with a nail puller.

c. Cut open the case liner.

d. Remove the excelsior and other cushioning.

e. Lift the inner corrugated carton and contents from the shipping case.

f. Remove the outer corrugated carton.

g. Remove the moisture-vaporproof barrier.

h. Remove the inner corrugated carton.

i. Open the carrying case.

j. Remove the cushioning material, wrapping, and desiccant.

k. Check the cable lasher and case for any apparent damage.

9. Preparation of Cable Lasher for Operation

a. Remove the cable lasher from the carrying case. Open one cover of the lasher by loosening the wingnut on the cover latch.

b. Cut and remove the lashing wire coil binding at the loop located at the center (inside end) of the coil. Cut and remove the opposite binding. Do not cut the other two bindings.

c. Cut off the loop of the wire and unwind about 1 foot of wire from the inside of the coil. The loose end should emerge from the face side of the coil.

d. Place the coil in the lasher magazine with the face of the coil toward the open side of the magazine. Feed the inside end of the wire (from the center of the coil) through the throat and over the pulley (C, fig. 3); close the cover and tighten the wingnut lightly.

e. Cut and remove the two remaining bindings. Tighten the wingnut.

f. Thread the lashing wire around the lower tensioning pulley (fig. 4); and wind the free end of the wire around the upper tensioning pulley and then serve it securely to prevent it from projecting or dangling from the lasher.

g. When removing the lasher from the carrying case, leave the front cable lifter in open position (fig. 3) and the drum in the indexed and locked position.

h. Close and adjust the rear cable lifter (fig. 5) to its lowest position. Adjust the rear vertical rollers to their widest positions.

i The strand-tensioning roller should be in the open position (fig. 3).

j. Adjust the rear cable lifter to the open position (fig. 6).

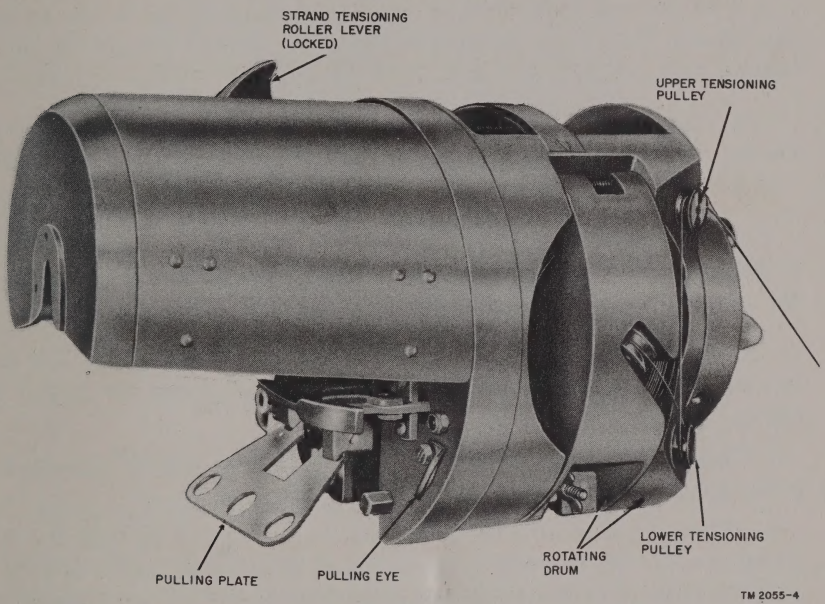

Figure 4. Cable Lashing Machine LC-231/FT, front and side view.

Section II.

OPERATION UNDER USUAL CONDITIONS

10. Operating Procedure

a. Raise the lasher by means of a handline.

b. Place the lasher on the strand. Be sure that the strand drive wheels and small rear trailer wheel (fig. 6) are positioned properly on the strand.

c. Engage the strand-tensioning roller (fig. 3) by rotating the lever forward and then swinging it backward to the end of its travel; this locks

the lasher on the strand. When the roller is in the engaged position, the lever is parallel to the strand.

d. Close the rear cable lifter. Turn the cable lifter adjusting knob (fig. 5) so that the top of the cable will be from 1/8-inch to 1/4 inch from the underside of the strand. *Raise a large cable off the roller when making this adjustment;* then adjust the vertical cable rollers (fig. 5) by turning the adjusting knob to clear the cable approximately 1/8-inch. Do not change these adjustments so long as the same diameter cable is being lashed.

e. Pull out sufficient steel lashing wire for termination on the suspension strand. Hold the wire temporarily to the strand by using the type C lashing wire grip. Terminate and serve the lashing wire as follows:

(1) Place a type C cable lashing clamp on the strand, positioned so the lashing wire will cross over the strand before the wire is terminated. Tighten the clamp to prevent it from rotating on the strand.

(2) Make at least one full turn of the wire around the strand and bring it under and over the clamp stud between the washer and the shoulder of the stud, so the free end of the wire extends parallel to the strand.

(3) Tighten the nut. Cut the free end of the wire about 1/4 inch beyond the clamp and form the wire end snugly around the end of the clamp.

f. Close the front cable lifter, attach the towing line as described in paragraph 3*e*, and pull the lasher to the end of the span.

g. When the span of cable and strand have been lashed, hold the wire to the strand with the type C grip; cut off a suffcient length of lashing wire for termination; wind and serve the free end of the wire around the upper tensioning pulley (par. 9*f*); terminate the wire as outlined in subparagraph *e* above; and proceed as follows:

(1) Move the lasher forward or backward along the strand until the drum locks.

(2) Release the strand-tensioning roller by swinging the lever forward and then rotating it to a position crosswise of the strand (fig. 5). This unlocks the lasher from the strand.

(3) Open the front and rear cable lifters.

(4) Transfer the lasher around the pole.

(5) Repeat the operating procedure.

Note. Avoid splicing the lashing wire. Replace the coil if the remaining wire is insufficient to lash a complete span.

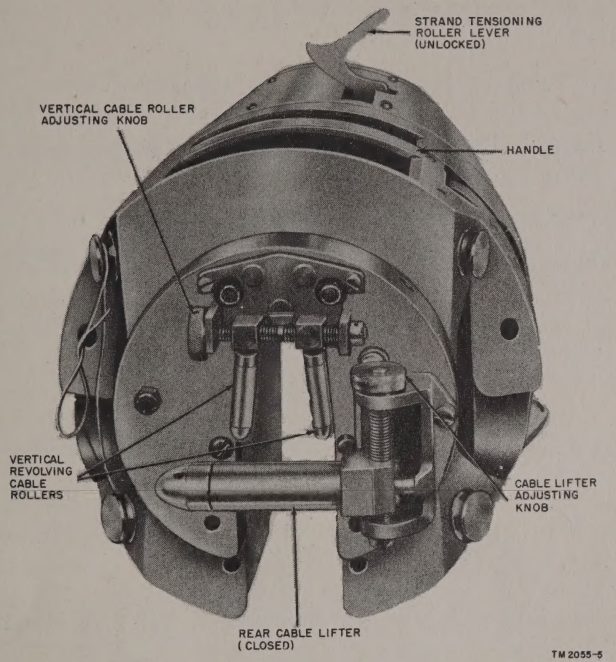

Figure 5. Cable Lashing Machine LC-231/FT, real view.

11. Removing Lasher from Suspension Strand

Remove the lasher from the strand preparatory to lowering it to the ground by proceeding as instructed in paragraph 10*g* (1), (2), and (3); then continue as follows:

a. Attach the handline to the lasher handle.

b. Raise the lasher from the strand; close the front and rear cable lifters; and lower the lasher to the ground.

c. The lasher should be kept in the carrying case when it is not in actual use.

Caution: Be sure that the front cable lifter is fully open and that the drum is in the locked position before placing the lasher in the carrying case.

Section III.
OPERATION UNDER UNUSUAL CONDITIONS

12. General

The instructions for operating Cable Lashing Machine LC-231/FT

under unusual conditions are the same as those given in section II, for operation under usual conditions. Some protective measures are given in paragraph 13.

13. Arctic, Tropical, Desert, and High Humidity Climates

a. In arctic climates, keep the lasher sheltered and keep it heated before and after use to minimize stiffness of gear and bearing lubrication and brittleness of the rubber drive wheels.

b. In tropical climates, keep the lasher dry and clean.

c. In desert climates, keep the lasher free of dust and sand to prevent binding and contamination of gear lubricants.

d. In high humidity climates, keep the lasher dry and clean. Lubricate it more frequently.

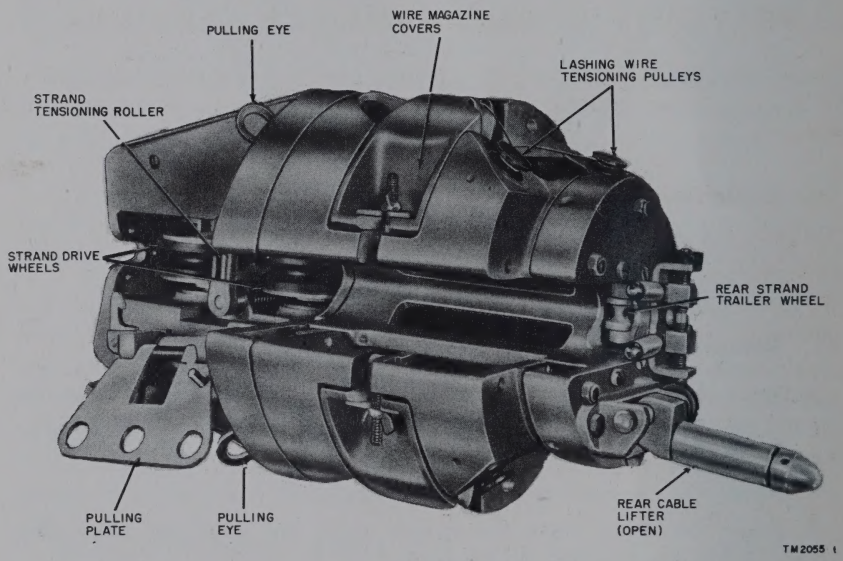

Figure 6. Cable Lashing Machine LC-231/FT, bottom and rear view.

CHAPTER 3

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Note. The maintenance instructions in this chapter are written for organizational maintenance personnel (operators and repairmen). The amount of organizational maintenance to be performed will depend on the tools and test equipment issued and the existing military regulations.

Section I. PREVENTIVE MAINTENANCE SERVICES

Note. Preventive maintenance services are a function of the using organization. These services consist generally of scheduled services performed by the organization personnel.

14. Definition of Preventive Maintenance

Preventive maintenance is work performed on equipment (usually when the equipment is not in use) to keep it in good working condition so that the break-downs and needless interruptions in service will be kept to a minimum. Preventive maintenance differs from trouble shooting and repair since its object is to prevent certain troubles from occurring. See AR 750-5.

15. General Preventive Maintenance Techniques

a. Use #0000 sandpaper to remove corrosion.

b. Use a clean, dry, lint-free cloth or a dry brush for cleaning.

c. Use limited amounts of gasoline or Solvent, dry-cleaning (SD), Federal P-S-661a, for cleaning. Keep cleaning fluids from contacting the rubber drive wheels, and gear lubricants.

d. Check all moving parts and controls for free operation, binding, cracks, and general condition.

e. Check the rubber drive wheels, the front and rear cable lifter rollers, the rear vertical cable rollers, the strand-tensioning roller, the rear trailer wheel, the brake, and other moving parts for excessive wear, binding, cracks, or breakage.

f. Tighten all accessible assembly hardware weekly to insure that various assemblies are secure and in proper alinement with their housings and mountings.

g. Check the strand-tensioning pulleys, the rotating drum, the gear drive, the wire coil cover doors, the tow-plate, the brake adjustment, and the cable lifters for free operation, binding, and alinement.

h. Check housings for bends, cracks, and excessive wear.

i. For further information on preventive maintenance techniques, refer to TB SIG 123.

Section II. LUBRICATION

16. Lubrication Under Usual Conditions

a. The following parts require *weekly* lubrication with Oil, engine (OE 10):

(1) The shaft of the rear strand trailer wheel.

(2) The post and roller of the front cable lifter.

(3) The hinge of the pulling plate.

(4) The horizontal shaft and vertical shaft of the strand-tensioning roller.

(5) The latch and roller of the rear cable lifter.

(6) The front brake release arm and the cam contact surface.

b. The following parts require *monthly* lubrication with oil (OE 10):

(1) The shaft and threads of the rear vertical cable rollers.

(2) The shaft and threads of the rear cable lifter.

(3) The latch post and hinge of the magazine cover.

17. Lubrication Under Unusual Conditions

The effects of extreme cold and heat on material and lubricants are explained in TB SIG 69. Observe all precautions outlined in TB SIG 69 and pay strict attention to all lubrication orders when operating equipment under conditions of extreme cold or heat. Refer to section II, chapter 3, for detailed instructions.

a. In tropical regions, lubrication may be required more frequently than under normal conditions (par. 16).

b. In desert regions, wind-blown dust or sand generally will require more frequent lubrication and thorough cleaning of moving parts and assemblies of the cable lasher.

Section III. WEATHERPROOFING

18. Weatherproofing

a. GENERAL. Signal Corps equipment, when operated under severe climatic conditions, such as prevail in tropical, arctic, and desert regions,

requires special treatment and maintenance. Fungus growth, insects, dust, corrosion, salt spray, excessive moisture, and extreme temperatures are harmful to most materials.

b. TROPICAL MAINTENANCE. Cable Lashing Machine LC-231/FT requires no moistureproofing and fungiproofing treatment.

c. WINTER MAINTENANCE. Special precautions necessary to prevent poor performance or total operational failure of equipment in extremely low temperatures are fully explained in TB SIG 66 and TB SIG 219.

d. DESERT MAINTENANCE. Special precautions necessary to prevent equipment failure in areas subject to extremely high temperatures, low humidity, and excessive sand and dust are fully explained in TB SIG 75.

Note. Excess dirt, dust, and sand will prevent the cable lasher from operating satisfactorily.

19. Rustproofing

If the finish on the lasher has been scarred or damaged, prevent rust and corrosion by touching up bared surfaces. Sand the surface down to the bare metal with #00 or #000 sandpaper. Obtain a bright smooth finish. Remove rust from corroded metal by cleaning it with solvent (SD).

Caution: Do not use steel wool. Minute particles of steel wool may enter the gears, bearings, and shafts and cause harmful damage to those parts.

Section IV.
TROUBLE SHOOTING AT ORGANIZATIONAL MAINTENANCE LEVEL

20. Trouble-Shooting Steps

The first step in the maintenance of the cable lasher is to sectionalize the trouble (if possible) through inspection. *Sectionalization* means tracing the fault. The second step is to localize the fault. *Localization* means tracing the fault to the defective part in the component suspected of being responsible for the trouble.

21. Visual Inspection

a. Virtually all the parts and assemblies in the cable lasher can be inspected by the senses (sight, touch, smell, etc.) to determine whether they normally are operating in good condition. Visually inspect for worn or defective rubber drive wheels, rear vertical cable rollers, strand-tensioning roller, cable lifters, pulling plate, rear trailer wheel, tensioning pulleys, operation of brake, gear drive, and rotating drum.

b. Check the cable lasher by an operational test using lashing wire on a suspension strand and cable. Follow operational procedures given in

paragraphs 9 through 11. Defective parts and adjustment requirements will become evident during this operational test and indicate the necessary adjustments required.

22. Trouble Shooting (Using Equipment Performance Checklist)

a. GENERAL. The equipment performance checklist (par. 23) will help to locate trouble in the lasher. The list gives the item to be checked, the normal indications of correct operation, and the corrective measures that can be taken by the operator. To use this lift, follow the items in numerical sequence.

b. ACTION OR CONDITION. For some items, the information given in the *Action or condition* column consists of various control settings under which the item is to be checked. For other items, it represents an action that must be taken to check the normal indication given in the *Normal indication* column.

c. NORMAL INDICATIONS. The normal indications listed include the visible and audible signs that the operator should perceive when he checks the items. If the indications are not normal, the operator should apply the recommended corrective measures.

d. CORRECTIVE MEASURES. The corrective measures listed are those which the operator can make without turning in the equipment for repairs. If the set is completely inoperative or if the recommended corrective measures do not yield results, trouble shooting is necessary.

23. Equipment Performance Checklist

	Item No.	Item	Action or condition	Normal indications	Corrective measures
PREPARATORY	1	Wire cover wingnuts.	Loosen wingnut.	Wire coil cover doors should spring open.	Replace or reseat tension spring. Straighten door-shaft and bent door.
	2	Lashing wire coil bindings.	Cut and remove at loop at inside of coil. Cut opposite binding.	Wire should unwind from inside of coil when inside loop is cut.	Replace wingnut assemblies. Straighten coils that are twisted or replace with new coils.
	3	Tensioning pulleys.	Thread lashing wire around pulleys.	Pulleys should move freely.	Lubricate and realine.
	4	Front cable lifter.	Turn to open position. Turn to closed position.	Rotating drum should be in indexed and locked position. Rotating drum should revolve freely.	Check bearing alinement and condition of housing; check brake linkage and adjustment.
	5	Rear cable lifter.	Open and close.	Knob adjustment for proper height of cable.	Examine thread; check rear roller action.
	6	Rear vertical rollers.	Adjust to widest position.	Rollers should adjust through full widths when adjusting knob is turned.	Check and lubricate thread; straighten rollers.
	7	Strand-tensioning roller.	Placed in open position.	Lever should rotate forward and backward.	Lubricate assembly.

23. Equipment Performance Checklist (contd)

	Item No.	Item	Action or condition	Normal indications	Corrective measures
O	8	Rear cable lifter.	Open and place lasher on strand.	Lasher rolls freely on strand.	Open strand-tensioning roller; release brake; close front cable lifter.
P	9	Strand-tensioning roller. lever.	Rotate forward then swing back to end of travel.	Locks lasher on strand.	Lever should be parallel to strand; check condition of rollers.
E	10	Rear cable lifter roller.	Close and adjust lifter to position cable 1/8" to 1/4" from strand.	Roller should lift cable to strand.	Check adjustment knob; straighten bent roller.
R	11	Vertical cable rollers.	Adjust to clear cable 1/8" each side.	Holds adjustment.	Straighten bent rollers; lubricate threaded shaft.
A			Cable jams in rear of lasher.	Maintains cable in proper position.	Readjust vertical rollers; readjust height of rear cable lifter.
T	12	Lashing wire.	Pull wire out; terminate on strand 1 foot from rear of lasher.	Feeds smoothly.	Examine wire coil for snarls; check tensioning pulleys. Cut off snarled wire; rethread through pulleys.
I	13	Front cable lifter.	Close. Attach towing link snap hook to pulling plate.	Brake is off when lasher is pulled forward. Brake prevents back roll; lasher locked when pulling plate swings back.	Check brake adjustment, rubber pulleys, strand-tensioning roller, and tension on pulling plate.
O	14	Rotating drum.	Pull lasher forward with towing bridle and handline.	Revolves freely when controls are set for lashing. Lashing wire feeds evenly, lashes tightly around cable and strand.	Check for correct position of cable lifters and pulling plate; check for bent housing, broken bearings, and dirt in rear gear.
N	15	Rotating drum.	Push lasher back.	Drum locks; brake prevents back roll; no slack in lashing wire.	Check brake adjustment; reposition strand-tensioning roller lever.
	16	Strand-tensioning roller.	Release.	Unlocks lasher from strand.	Check brake pulling plate position, cable lifters, and spring on strand-tensioning roller assembly.

CHAPTER 4

FIELD MAINTENANCE INSTRUCTIONS

Section I. MAINTENANCE

Note. This chapter contains information for field maintenance. The amount of repair that can be performed by units having field maintenance responsibility is limited only by the tools and test equipment available, and by the skill of the repairman.

24. General

The repair of Cable Lashing Machine LC-231/FT is to be performed in field maintenance shops. When a cable lasher is being repaired it also may require thorough internal cleaning and lubrication.

25. Trouble-shooting Procedure

The first step in servicing a cable lasher is to sectionalize the fault. The second step is to localize the fault. Localization means tracing the fault to the defective part. The majority of faults must be localized by checking the operation of the equipment (par. 23). The trouble-shooting chart (par. 26) indicates the symptoms of probable troubles and corrective remedies.

26. Trouble-shooting Chart

Symptom	Probable trouble	Correction
Lasher does not lock on stand.	Worn rubber drive wheels; worn strand-tensioning roller. Brake out of adjustment. Broken tow plate.	Replace rubber wheels, tensioning roller, and tow plate as required. Adjust brake.
Drum does not rotate.	Defective bearings and gear drive; jammed brake. Dirt in lasher. Bent housing.	Check cable lifter position, alinement, and condition of bearings. Check brake adjustment; clean lasher; replace housing.
Lasher rolls back along strand.	Defective brake, broken tow plate, worn rubber drive wheels.	Replace defective brake parts, tow plate, and rubber wheels as required.
Lasher housing throat rests on tension strand.	Worn rubber drive wheels. Worn rear trailer wheels.	Replace worn wheels.
Gear drive jammed.	Bent housing; broken gears or bearings. Dirt in gear train, brake is jammed Front cable roller is jammed.	Replace housing, gears, and bearings as required. Disassemble and clean, repair, straighten, or replace as required.

Section II. DISASSEMBLY AND REPAIR

27. Step-by-step Disassembly and Repair

A precise and orderly step-by-step procedure for disassembling the lasher is given below. This procedure has been developed by the manufacturer to assure a thorough check of the lasher's parts and assemblies. Alinement and clearances of moving surfaces are fitted to critical dimensional tolerances, particularly the gear train and ball-bearing assemblies. Proceed as follows:

a. Preliminary Steps. Remove the lasher from the carrying case; repair the catches, hinges, and lid chain of the case; and remove the lashing wire from the lasher.

b. Rear Vertical Cable Roller Assembly. Remove the assembly by removing the three assembly screws.

c. Rear Cable Lifter Assembly. Remove the assembly by removing the three cap screws.

d. Front Cable Lifter. Remove the lifter by removing one inside screw seated past the rubber drive wheels.

e. Towing Plate. Disengage the plate from the cable lifter by removing one long screw and tension spring. Then remove the three remaining screws.

f. Brake Lever Tension Spring. Remove the spring from its socket.

g. Gear-Drive Housing Cover. Remove the cover by removing the four screws from the underside. Two screws are located on each side of the rubber drive wheels.

h. Gear-Drive Housing. Remove the housing by first tapping the four holding screws and lockwashers with a hammer and remove them with a screw driver. Then remove the two alining dowel pins with a hammer and a drive pin punch. Lift off the gear drive housing.

i. Front Plate. Remove the front plate by removing the four flathead countersunk screws positioned around the cable slot. Tap the plate lightly from its underside.

j. Front Plate Bearing Assembly. Examine the eight bearings inside the front plate. Replace or realine as required.

k. Rear Plate. Separate the plate from the rotating drum by tapping the cable spacer.

l. Rear Plate Bearing Assembly. Examine the 10 bearings inside of the rear plate. Replace or realine them as required.

m. Spacer. Remove the spacer from the rear plate by removing the two filister-head screws.

n. Rear Strand Roller Assembly. Remove the assembly by removing the two countersunk screws from the rear plate.

o. Rotating Drum Cowling. Leave the cowling intact.

p. Bronze Shaft, Rear Strand Roller Assembly. Remove the shaft by loosening the socket screw. Examine the shaft for end play.

q. Lashing Wire Coil Door. Remove the steel bearing ring by removing 11 No. 6-32 roundhead machine screws. Remove the ring gear by removing seven 1/2-inch fillister-head machine screws. Remove the flush-mounted threaded door shaft by inserting a No. 8-32 screw up through the mounting holes. The tension spring will release.

r. Coil Door Bolt and Thumbscrew Assembly. Remove the threaded shaft through the access hole.

s. Small Bearing Ring. Remove the ring by removing 17 No. 6-32 roundhead machine screws.

t. Strand-Tensioning Roller. Remove the roller by loosening the recessed Allen setscrew.

u. Wire Coil Door Roller. Remove the cotter pin on the inside of the door; slide the shaft through the access hole.

v. Gear Drive. (1) *Brake.* Disengage the brake by removing the two (one on each side) fillister-head screws. Lift the brake out.

(2) *Strand-tensioning roller assembly.* Remove the screw from the lever; remove the hollow bushing; slide the shaft out.

(3) *Strand-tensioning roller replacement.* Loosen 2 No. 6-32 Allen setscrews in the bronze casting. Replace the roller and the pin.

(4) *Rubber drive wheel replacements.* Disengage the shaft with the small bevel gears and collar by removing the retaining ring. Remove the taper pin from the small bevel gear and from the collar; slide the gear and collar off. Slide the shaft with the larger gear off, from the opposite direction. Remove the taper pin from the larger bevel gear, from the opposite side from which the shaft was removed. Loosen the hexagonal nut on the rear rubber drive wheel roller shaft. Turn the wheel to disengage the square aluminum nut from the shaft; remove the wheel. To remove the front rubber drive wheel, remove the retaining ring from the drive wheel shaft; turn the wheel to disengage the nut.

w. Lubrication. General lubrication (par. 16) and a thorough cleaning usually will be required when the cable lasher is being repaired. If the gear train requires lubrication, apply a light treatment of approved graphite grease. No other internal lubrication will be required because precision-sealed bearings are used exclusively.

28. Reassembly

Unusual care is required when reassembling the cable lasher. Follow in reverse order the step-by-step procedure given in paragraph 27.

CHAPTER 5

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section 1. SHIPMENT AND LIMITED STORAGE

29. Repacking for Limited Storage

Before packing the lasher, open the front cable lifter and lock the rotating drum.

a. Place the lasher in a corrugated carton, cushion the lasher in the carton with pads of corrugated fiberboard or other cushioning material, and place several bags of desiccant in the carton.

b. Place the carton in the lasher carrying case, and pack the lasher in an outer corrugated carton.

c. Provide the outer carton with moisture-vaporproof barriers; pack it in a wooden shipping container and nail it securely.

30. Repacking for Shipment

a. The procedure of packing the lasher for shipment is practically as outlined in paragraph 29.

b. Secure the wooden shipping container with steel strapping.

Section II. DEMOLITION TO PREVENT ENEMY USE

31. Methods of Demolition

a. SMASH. Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.

b. CUT. Use axes, handaxes, machetes.

c. BURN. Use gasoline, kerosene, oil, flame throwers, incendiary grenades.

d. EXPLODE. Use firearms, grenades, TNT.

e. DISPOSE. Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

Note. Use anything immediately available for destruction of this equipment.

32. Destruction of Components

When ordered by your commander, destroy all equipment to prevent its being used or salvaged by the enemy.

a. Smash (par. 31*a*) the carrying case and protruding parts, such as cable lifters, strand rollers, housings, controls, shafts, and gears.

b. Cut (par 31*b*) lashing wire coils and towing bridle.

c. Burn (par. 31*c*) all instruction books and carrying case.

d. Bury or scatter (par 31*e*) all remaining parts of the equipment.

DESTROY EVERYTHING

APPENDIX I

REFERENCES

Note. For availability of items listed, check SR 310-20-3, SR 310-20-4, and SR 310-20-5. Check Department of the Army Supply Catalog SIG 1 for Signal Corps Supply Catalog pamphlets.

1. Army Regulations

AR 380-5	Military Security (Safeguarding Military Information).
AR 750-5	Maintenance of Supplies and Equipment (Maintenance Responsibilities and Shop Operation).

2. Supply Bulletins

SB 11-47	Preparation and Submission of Requisitions for Signal Corps Supplies.
SB 11-76	Signal Corps Kit and Materials for Moisture-and Fungi-Resistant Treatment.
SB 11-100	Serviceability Standards for Signal Equipment in Hands of Troops.

3. Preserving and Lubrication

TB SIG 13	Moistureproofing and Fungiproofing Signal Corps Equipment.
TB SIG 69	Lubrication of Ground Signal Equipment.

4. Decontamination and Demolition

FM 5-25	Explosives and Demolitions.
TM 3-220	Decontamination.

5. Other Publications

SR 310-20-3	Index of Training Publications.

SR 310-20-4	Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, Modification Work Orders, Tables of Organizaion and Equipment, Reduction Tables, Tables of Allowances, Tables of Organization, and Tables of Equipment.
SR 310-20-5	Index of Administrative Publications.
SR 700-45-5	Unsatisfactory Equipment Report (Reports Control Symbol GSGLD-247).
SR 745-45-5 NAV DEPT SERIAL 85POO AFR 71-4	Report of Damaged or Improper Shipment (Reports Control Symbols CSGLD-66 (Army), Sand A-70-6 (Navy), and AF-MC-U2 (Air Force).
TB SIG 66	Winter Maintenance of Signal Equipment.
TB SIG 72	Tropical Maintenance of Ground Signal Equipment.
TB SIG 75	Desert Maintenance of Ground Signal Equipment.
TB SIG 123	Preventive Maintenance Practices for Ground Signal Equipment.
TB SIG 219	Operation of Signal Equipment at Low Temperatures.
TM 11-453	Shop Work.
TM 11-2263	Lead-Covered Cable Construction and Maintenance.

APPENDIX II

IDENTIFICATION TABLE OF PARTS

Note. The following is an identification table of parts for Cable Lashing Machine LC-231/FT (Sig C stock No. 6R194-1). The fact that a part is listed in this table is not sufficient basis for requisitioning the item. Requisitions must cite an authorized basis, such as a specific T/O & E, T/A, SIG 7 & 8, SIG 7-8-10, list of allowances of expendable material, or another authorized supply basis. The Department of the Army Supply Catalog applicable to the equipment covered in this instruction book is SIG 7 & 8-LC-231/FT. For an index of available supply catalogs in the Signal portion of the Department of the Army Supply Catalog, see the latest issue of SIG 1, Introduction and Index.

Identification Table of Parts

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O-101	ARM: p/o gear drive.	Releasing lock.	6Q481-2
O-501	ARM: p/o front cable lifter assembly.	Supports cable lifter assembly parts.	6Q481-1
O-601	ARM: p/o rear cable lifter.	Opens and closes cable lifter assembly.	6Q481
O-115	CAM: p/o gear drive assembly.	For brake adjusting.	6Q16855
	CASE: ½" plywood, reinforced w/riveted steel-band edges and corners.	For storing or transporting cable lasher.	6F206-5
H101	CLAMP: p/o gear drive assembly.	Drive adjustment clamp, preventing back roll.	6Q27402
A905	DOOR.	Gear drive access door.	6Q31850
	GEAR: consists of several parts.	Parts of gear-drive assembly.	6Q45800 6Q45801 6Q45802 6Q45803 6Q45804 6Q45805
	GEAR: p/o rotating drum.	Connects rotating drum into gear drive.	6Q45806
H201	HANDLE.	To carry lasher by hand.	6Q51114-6
H502	HANDLE: p/o front cable lifter.	Part of brake mechanism.	6Q51107
A201, A202, A203, A204	HOUSING: p/o rotating drum.	House ball bearing wheel assembly.	6Q53625
H102	KEEPER: for gear drive of cable lifter tensioner.	Alines lifter tensioner.	6Q57175
	KNOB: p/o vertical cable roller.	Adjusting knob.	2Z5822-721

Identification Table of Parts (contd)

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
H301	LATCH, lever: p/o front plate assembly.	Locking mechanism for rotating drum.	6Q62575
H503	LATCH, lever: p/o front cable lifter.	Positions front cable lifter.	6Q62576
A101	MOUNTING, bracket: p/o gear drive.	Arm support.	6R1255
A103	MOUNTING, gearcase.	Houses and supports cable lifter tensioner.	6R1269
A102	MOUNTING, housing.	For gear-drive assembly.	6R1270-1
A104	MOUNTING, housing.	Mounts cable lifter roller.	6R1270-2
A207	MOUNTING, housing: rotating drum cover, lh.	Hinged cover on rotating drum.	6R1270-3
A206	MOUNTING, housing: rotating drum cover, rh.	Same as A-207.	6R1270-4
A502	MOUNTING, gearcase.	Mounts and houses rotating drum parts.	6R1269-1
A301	MOUNTING, housing: p/o front plate assembly.	Mounts and houses front plate assembly.	6R1270-7
A401	MOUNTING, housing: p/o rear plate assembly.	Rear plate assembly housing.	6R1270-8
A501	MOUNTING, housing: p/o front cable lifter assembly.	Front cable lifter housing.	6R1270-9
A205	MOUNTING, housing: p/o front cable lifter.	For front cable lifter parts.	6R1270-10
A601	MOUNTING, housing: p/o rear cable lifter.	Rear cable lifter assembly.	6RI270-5
A602	MOUNTING, housing: p/o rear cable lifter.	Rear cable lifter housing.	6R1270-6
A701	MOUNTING, housing: p/o vertical roller assembly.	Inclosure for vertical roller assembly.	6R1270
A302	PLATE, angle: p/o front plate.	Locking mechanism.	6R4218
A303	PLATE, angle: auxiliary towing rings.	For angle towing.	6R4218-1
H-902	PLATE, catch: front cable lifter regulator.	Controls front cable lifter position.	6R4225
H501	PLATE, drawbar.	For connecting towing bridle to lasher.	6R4235
O-809	PLATE, guide: p/o wire coil cover.	To secure covers.	6R4229
O-810			

Identification Table of Parts (contd)

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O-116	PLATE, reinforcing: supporting plate.	For cable lifter tensioner.	6R4231
O-901	RING, bearing.	For mounting rotating drum assembly.	6R8900
O-902	RING, bearing.	For mounting gear-drive assembly.	6R8900-1
O-117	RING, retainer.	Secures bearings to shafts.	2Z7858-280
O-118, O-119, O-120	RING, retainer: p/o gear drive assembly.	Secure bearings to shafts.	2Z7858-305
O-212	ROD, fulcrum.	Pivot rod in cable lifter tensioner.	6R9200
O-122	ROLLER, CABLE SPINNER.	Guide roller for cable lifter tensioner.	6R9340
O-704, O-705	ROLLER, CABLE SPINNER: p/o verticle cable roller.	Cable guides.	6R9340-1
O-411	ROLLER, shaft: p/o rear plate assembly.	For rear trailer wheel.	6R9360
A900	ROPE ASSEMBLY: manilla hemp, 3 strands twisted, 3/8" dia, 48" lg, 2 ea snap hooks.	Towing bridle.	6R9400
O-125	SHAFT: gear drive.	Mounts gears in gear drive.	6R20060
O-126-7	SHAFT.	Mounts gear-drive parts.	6R20060-2
O-128	SHAFT: single piece; SS.	Part of gear-drive assembly.	6R20060-1
O-123	SHAFT: single piece; SS.	For cable lifter tensioner.	6R20060-3
O-124	SHAFT: gear drive.	Mounts gears in gear drive.	6R20060-4
O-312	SHAFT: p/o front plate assembly.	For locking device.	6R20060-9
O-506	SHAFT: p/o front cable lifter assembly.	For towing plate drawbar.	6R20060-8
O-608	SHAFT: p/o rear cable lifter assembly.	Vertical shaft for lifter assembly.	6R20060-7
O-706	SHAFT: p/o vertical cable roller.	Adjusting screw shaft.	6R20060-6

Identification Table of Parts (contd)

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O-707-8	SHAFT: p/o vertical cable roller.	Same as O-706.	6R20060-5
O-129	SPRING: helical torsion.	Provides tension in cable lifter tensioner.	6R25306-1
O-130	SPRING: helical torsion.	Same as O-129.	6R25306
O-131	SPRING: helical compression.	Provides tension on brake adjustment clamp.	6R25305-3
O-205	SPRING: helical compression.	Provides tension on hinged covers.	6R25305-4
O-314	SPRING: helical compression.	Provides tension on latch shaft of front plate.	6R25305-5
O-507	SPRING: helical compression.	For towing bridle plate drawbar.	6R25305-6
O-508	SPRING: helical compression.	For front cable lifter latch.	6R25305
O-609	SPRING: helical compression.	Engages lock to rear cable lifter roller.	6R25305-1
O-903	SPRING: helical compression.	Maintains tension on door assembly.	6R25305-2
H209, H210	STUD: p/o rotating drum.	Assembly hardware.	6L31147-7
H211, H212	STUD: p/o rotating drum.	Assembly hardware.	6L31147-10
H312, H313, H314, H315, H316, H317, H318, H319, H320,	STUD: p/o front plate assembly.	Shafts for bearing rollers.	6L31147-9

Identification Table of Parts (contd)

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
H321, H322, H323			
H324, H325	STUD: p/o front plate assembly.	Shafts for bearing rollers.	6L31147-8
H409, H410, H411, H412	STUD: p/o rear plate assembly.	Parts of shaft assemblies for roller bearings.	6L31147-6
H507	STUD: p/o front cable lifter.	Assembly hardware.	6L31147-5
H705, H706	STUD: p/o vertical cable roller.	For attaching roller fingers to housing.	6L31147-4
O-313	SUPPORT; shaft: p/o front plate assembly.	Supports shaft on lock.	6R32811
A402	SUPPORT; housing: p/o rear plate assembly.	Supports and houses rear trailer wheel and shaft.	6R32810
O-207, O-208, O-209, O-210	WHEEL: p/o rotating drum.	Strand-tensioning pulleys.	6R50150
O-132, O-133	WHEEL, friction drive: rubber; grooved.	Drive lasher along suspension strand.	6R50151
O-412	WHEEL, idler: p/o rear plate assembly.	Guides rear of lasher along suspension strand.	6R50152
O-811, O-812	WHEEL, idler.	Pulley for lashing wire.	6R50152-1
A800	WIRE COIL COVER ASSEMBLY: lh.	Houses and mounts left-hand wire coil cover.	6Q29243
A801	WIRE COIL COVER ASSEMBLY: rh.	Houses and mounts right-hand coil cover.	6Q29243-1

INDEX

	Paragraph	Page
A		
Additional equipment required:		
Cable lashing clamp	7	5
Lashing wire	7	5
Lashing wire grip	7	5
Rope, handline	7	5
Adjusting rear cable lifter	10*d*	8
B		
Brake	4*j*, 6*b*, 21*a*	3, 4, 13
Bridle, towing	6*d*, 6*e*	5
C		
Cable:		
Lashing clamp	7, 10*e* (1)	5, 8
Lifter adjusting knob	10*d*	8
Lifters	4*e*, 6, 9*g*, 10*d*, 10*f*, 21*a*	2, 4, 7, 8, 13
Rollers	4*e*, 6*b*	2, 4
Sizes accommodated	3*a*	1
Cable Lashing Machine LC-231/FT:		
Characteristics, technical	4	2
Components	6	4
Description	6	4
Moving, to lock the drum	10*g*(1)	8
Operating	10, 11	7, 9
Placing, on strand	10*b*	7
Precautions	11*c*, 19	9, 13
Preparation of, for operation	9	6
Purpose and use	3	1
Removing, from strand	11	9
Carrying case:		
Description	6*e*	5
Hardware	6*e*	5
Precautions when placing lasher in	11*c*	9
Use	11*c*	9
Chart, trouble-shooting	26	17
Checking equipment	8	6
Checklist, equipment performance	23	15
Clamp, cable lashing	7, 10*e*(1)	5, 8
Coils, lashing wire	4*k*, 9	3, 6
Components	6	4
Cover, magazine	6, 16*b*	4, 12

	Paragraph	Page
D		
Data	5	3
Demolition to prevent enemy use	31	20
Description	6	4
Destruction methods	32	21
Dimensions and weight	3*b*	2
Disassembly procedure	17	12
Drive wheels	4*c*, 6, 21*a*, 27*v*(4)	2, 4, 13, 19
Drum, rotating	4*e*, 4*f*, 4*i*, 6*c*, 9*g*	2, 3, 5, 7
E		
Equipment:		
Additional required	7	5
Checking	8	6
Performance checklist	23	15
F		
Field maintenance:		
General	24	17
Trouble-shooting chart	26	17
Trouble-shooting procedure	25	17
Forms:		
AF Form 54, unsatisfactory report	2*c*	1
DA AGO Form 468, unsatisfactory report	2*b*	1
DD Form 6, report of damaged or improper shipment	2*a*	1
Front cable lifter	4*e*, 6, 9*g*, 10*f*, 16*a*, 27*d*	2, 4, 7, 8, 12, 18
G		
Gear drive	6, 21*a*	4, 13
Gear train lubrication	27*w*	19
Grip, lashing wire	7, 10*e*, 10*g*	5, 8
H		
Handline	7	5
I		
Identification table of parts	app II	24
Inspection of:		
Brake operation	21*a*	13
Cable lifters	21*a*	13
Drive wheels for worn or defective rubber	21*a*	13
Gear drive	21*a*	13
Pulling plate	21*a*	13

	Paragraph	Page
I		
Rear trailer wheel	21*a*	13
Rear verticle cable rollers	21*a*	13
Rotating drum	21*a*	13
Strand tensioning roller	21*a*	13
Wire tensioning pulleys	21*a*	13
L		
Large cable	10*d*	8
Lashing wire:		
Coils	4*k*, 9	3, 6
Grip	7, 10*e*, 10*g*	5, 8
Magazine	6*e*, 9*d*	5, 6
Stainless steel	7	5
Tensioning pulleys	6*a*, 6*c*, 9*f*, 21*a*	4, 5, 6, 13
Termination	10*e*	8
Lifters, cable	4*a*, 6, 9*g*, 10*d*, 10*f*, 21*a*	2, 4, 7, 8, 13
List of parts	app II	24
Lubrication:		
Arctic regions	17	12
Desert regions	17*b*	12
Gear train	27*w*	19
Tropical regions	17*a*	12
Under unusual conditions	17	12
Under usual conditions	16	12
M		
Magazine, lashing wire	6*e*, 9*d*	5, 6
Maintenance. (*See* Field maintenance, Organizational maintenance, Weatherproofing.)		
Marking packages	5*c*	4
O		
Operation:		
In arctic, desert, and tropical climates	13	10
Instructions	9-11	6-9
Preparation for	9	6
Under unusual conditions	12, 13	9, 10
Under usual conditions	10	7
Operational test	21*b*	13
Organizational maintenance:		
Preventive:		
Definition	14	11

	Paragraph	Page
O		
Lubrication	16, 17	12
Techniques	15	11
Rustproofing	19	13
Weatherproofing	18	12
Desert	18*d*	13
Tropical	18*b*	13
Winter	18*c*	13
P		
Packaging	5	3
Packing	5*b*	4
Plate, pulling	6*b*, 6*d*, 16*a*, 21*a*, 27*e*	4, 5, 12, 13, 18
Performance checklist	23	15
Placing lasher on strand	10*b*	7
Precautions	11*c*, 19	9, 13
Preparation for use	9	6
Preservation and packaging	5*a*	3
Preventive maintenance	14-17	11-12
Pulleys, wire tensioning	6*a*, 6*c*, 9*f*, 21*a*	4, 5, 6, 13
Pulling eyes	6*b*, 6*d*	4, 5
Pulling plate	6*b*, 6*d*, 16*a*, 21*a*, 27*e*	4, 5, 12, 13, 18
Purpose	3	1
R		
Rear cable lifter	4*e*, 9*j*, 10*d*, 16*b*, 27*c*	2, 7, 8, 12, 18
Rear trailer wheel	10*b*, 21	7, 13
Reassembly	28	19
Records	2	1
References	app I	22
Repacking for storage	29	20
Repacking for shipment	30	20
Repair procedure	27	18
Repairs	17	12
Reports. (*See* Forms.)		
Roller:		
Rear cable lifter	21*a*	13
Strand tensioning	6, 16*a*	4, 12
Rollers, vertical cable	6, 16*b*, 21*a*, 27*b*	4, 13, 18
Rope, handline	7, 10*f*, 11*a*	5, 8, 9
Rotating drum	4*e*, 4*f*, 4*i*, 6*c*, 9*g*	2, 3, 5, 7
Rubber strand drive wheels	4*c*, 6, 21*a*, 27*v*(4)	2, 4, 13, 19
Rustproofing	19	13

	Paragraph	Page
S		
Scope of manual	1	1
Service upon receipt of material	8	6
Serving lashing wire	10*g*	8
Shipment	29, 30	20
Storage	29, 30	20
Strand:		
Drive wheels	4*c*, 6, 21*a*, 27v(4)	2, 4, 13, 19
Placing lasher on	10*b*	7
Removing lasher from	11	9
Sizes of, lasher is used on	3*a*	1
Tensioning roller	6, 10*c*, 10*g*(2), 21*a*, 27*t*	4, 7, 8, 13, 19
Tensioning roller lever	10*c*	7
Suspension strand. (*See* Strand.)		
T		
Tabular list of parts	app II	24
Technical characteristics	4	2
Tensioning pulleys, lashing wire	6*a*, 6*c*, 9*f*, 21*a*	4, 5, 6, 13
Terminating lashing wire	10*e*	8
Test, operational	21*b*	13
Towing:		
Bridle	6*d*, 6*e*	5
Eyes	6*b*, 6*d*	4, 5
Line	7, 10*f*, 11*a*	5, 8, 9
Plate	6*b*	4
Trailer wheel	6, 10*b*, 16*a*, 21	4, 7, 12, 13
Trouble shooting:		
Chart	26	17
Localization	20	13
Sectionalization	20	13
Steps	20	13
Using equipment performance checklist	22	14
Visual inspection	21	13
U		
Uncrating	8	6
Unpacking	8	6
Use	3	1
Use of equipment performance checklist in trouble shooting	22	14

	Paragraph	Page
V		
Vertical cable rollers	6	4
Visual inspection	21	13
W		
Weatherproofing	18	12
Desert	18*d*	13
Tropical	18*b*	13
Winter	18*c*	13
Weight	3*b*	2
Wheels:		
Drive	4*c*, 6	2, 4
Rear strand trailer	6, 10*b*, 16*a*, 21	4, 7, 12, 13
Wire:		
Coils	4*k*, 9	3, 6
Lashing	6*c*, 7, 10*e*	5, 8
Magazines	6*e*, 9*d*	5, 6
Tensioning pulleys	6*a*, 6*c*, 9*f*, 21*a*	4, 5, 6, 13
Terminating lashing	10*e*	8